Domestic resources, governance, global links, and the economic performance of Sub-Saharan Africa

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Abstract: This paper uses a simple production function to show that the economic performance of a group of African countries in 2007 depended on three broad sources: domestic resources, governance, and global links. The results reveal that investment plays the most important part. The effects of education (knowledge) as a component of human capital is modest, while the health (life expectancy) part of human capital is negative. At the aggregate level external relations, measured as openness, are positively correlated with per capita income. However, disaggregated as integration, aid dependency, and net tourism, all three global links have a negative effect on performance. Also, two indicators of institutional quality (governance) show that average improvement in the quality of institutions has helped economic performance. Considering different dimensions of institutions, the rule of law, and safety and security of property rights are the most constraining aspects of institutions in this group of countries. The findings leave enough room technical for fine-tuning and sophisticated estimators, which cautions interpretation. However, it seems clear that developing countries do better improving domestic resources and institutions than relying for performance on external relations, even though such links cannot be dismissed lightly.
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1. Introduction

In recent years African countries have fared well relative to their performance history. Continent-wide only the HIV/AIDS problem represents a unique and present danger. Individually, even traditional laggards, corruption-laden and coup-prone nations have done well on the economic front - no major starvations, for example. This performance has prompted Jorge Arbache. Delfin Go, and John Page (2008) to ask whether "Africa's economy is at a turning point." What explains the recent performance, and how can it be made to stick? This paper explores such a question. It estimates and comments on the effects on economic performance of key domestic resources, governance as a measure of institutional quality, and international relations (global links) across a number of Sub-Saharan African countries in 2000, 2002, and 2007. The exercise is important for understanding the relative significance of the sources of growth for a region that has until recently suffered one misfortune upon another. The inspiration is the beautiful structure of the World Bank's World Development Indicators (WDI) reports which, intended or not, suggest that economic performance of any country depends on its people, its environment (broadly defined), its economy (narrowly defined), its current technological and market states, and its international relations. See any WDI copy. From this inspiration the analysis relies on simple the *rules of inference* of a conventional production function. Despite their simplicity, the transformations are powerful enough for the purpose at hand.[1]

Here is how the exercise proceeds. Section 2 scans the literature in search of the theoretical foundations of the estimations. Section 3 states the analytical framework, while Section 4 describes the estimations themselves. The results and their implications come in Section 5, followed by the conclusion in Section 6.

2. Sources of recent economic performance of Sub-Saharan Africa

I suggest that the recent economic growth performance of Sub-Saharan African countries came from three broad sources: (a) domestic resources (factors and forces of production), (b) governance (a measure of institutional quality), and (c) global links (a measure of openness to external contacts). In what follows I outline the literature that connects each source to economic performance.

2.1 Economic performance and domestic resources

• *Economic performance and primary factors of production*

The vast literature on the primary sources of economic performance is now well understood. Pre-independence, growth whatever there occurred in Sub-Saharan African countries, was an extensive type of growth deriving from the growth of labor, land (mainly mineral and agricultural commodities), and fixed capital in agriculture, and mining and quarrying (see Fafchamps, 2000, Amavilah, 1996).

Tahari, Ghura, Akitoby, and Aka (2004) find that for Sub-Saharan African countries growth during the 1960-2002 years depended on the accumulation of "objects" rather than "ideas"- to use Paul Romer's lingo. Over the same time period only Botswana, Equatorial Guinea, Gambia, and Mauritius grew at rates exceeding four per cent per annum (Basu, Calamitsis, Ghura, 2000, Acemoglu, Johnson, and Robinson, 2001a). Overall capital accumulation contributed to growth more than labor, although Amavilah (1996, 1998) suspects double-counting as a result of recording improvements in mining, for example, as additions to both primary sector and secondary sector capital. Beginning c. 1997 the number of African countries with growth rates above four per cent more than doubled. What explains this turnaround of things?

- *Economic performance and secondary or higher resources*

Secondary or higher resources mean fluid capital and human capital. Accordging to Lester Taylor (2000), and Amavilah and Newcomb (2004), fluid capital is cumulative net investment plus allowable depreciation. The first is subject to the capacity to invest set by the financial system, and the second is conditional on *in-situ* capacity to produce. There is little empirical study on this subject in general, least of all in Sub-Saharan Africa. Regarding human capital, Tahari, Ghura, Akitoby, and Aka (2004) argue that the recent growth is due to improved institutional quality, improved human capital, improved macroeconomic policy environment, and the broadening of the export base from a narrow range of commodities to semi-processed goods. Amavilah (2007) presents evidence supporting the positive effects of macroeconomic policy on the performance of 46 African countries in 2004. Moreover, O'Connell and Ndulu (2000), and Ndula and O'Connell (1999) associate the performance of Sub-Saharan African countries with capital accumulation, demographic changes, policy, institutions, political (in)stabiliy, and total factor productivity (TFP), where TFP is measured as the number of years of schooling. In that sense TFP is the same thing as human capital (H). Drawing on Barro and Lee (1996, 2000) base dataset for the value of human capital in economic performance, Benhabib and Spiegel (1994) show that most African countries lack the critical mass of H stock required for fast-growing TFP.

- *Economic performance and forces of production*

From both W. Arthur Lewis (1965) and Paul Romer (1990, 1993, 1994) it is clear that economic performance depends on factors and forces. A number of forces underscore Africa's growth and decline. Key among them are technology and institutions, where technology is measured variously as TFP and/or Solow residual (A), and institutions, often proxied by governance. In a recent paper Jean-Claude Maswana (2006) associates poor performance of African countries with lack of technological innovation and its underlying knowledge, and bad policies. The significance of institutions for economic performance has never been an issue for debate. The controversy has been over how to quantify the role of institutions.

2.2 Economic performance and governance

The extant literature shows that conventional factors and forces of production are necessary, but not enough to explain economic performance. Increasing evidence points to institutions and institutional quality as essential elements in the growth of both output and resources themselves. This is, however, not new evidence as classical economists like Adam Smith (1973 [1776]), and new classical economists like W. Arthur Lewis (1965), and contemporary theorists like North (1990), and Gradstein and Konrad (2006), to mention a few randomly, all touch on the role in economic performance of institutions and institutional quality. Aron (2000) provides an excellent review of the links between institutions and the economic performance of developing countries (see Table 1, pp. 108 - 113). From the review it is clear that countries with "good" institutions tend to do better than countries without or with "bad" institutions. What remains controversial is how to quantify the effects of institutions, but even that concern is waning, given what we now know from Acemoglu, Johnson, and Robinson (2001b, 2002)[2], Nunn (2008, 2005. 2004), Acemoglu and Johnson (2007), Amavilah (2006), and many others. In fact, some experts, like Sachs and Warner (1997), and Bloom and Sachs (1998) use geography to describe institutional effects on growth. Others turn to proxies like constitutions, political freedoms and social justice. In the past African countries have not done well by such measures.

Among other measures of institutional quality, governance has been the preferred indicator. For this reason experts in the area collect, rationalize, and update data for what now is called the Kaufman, Kraay, Zoido- and Mastrzzi (KKZM) index of governance (Kaufman and Kraay, 2008). Quibria (2006, p. 104), for example, shows that the KKZM composite correlates positively to the economic growth of a number of Asian countries.

Of the 18 or so common indices of governance, the World Bank's Worldwide Governance Indicators (WGI) is the most comprehensive (see www.worldbank.org/wbi/governance/). It covers 212 countries and territories over 1996-2006, and it has six dimensions: (a) voice and accountability, (b) political stability and absence of violence, (c) government and effectiveness, (d) regulatory quality, (e) rule of law, and (f) control of corruption. All six dimensions, individually and collectively, can make a statement about economic performance. For instance, where the rule of law is absent or weak, property rights will be fragile, markets dysfunctional, and economic performance most likely unsustainable.

In October 2006, the Mo Ibrahim Foundation at Harvard University's Kennedy School of Government released its own Mo Ibrahim African governance index (MIGI). Based on 2005 data, MIGI expands on a similar series for 2000 and 2002, and covers 48 countries. The compillers and financier of the MIGI claim that it is geographically more comprehensive than similar indices, and addresses biases that afflicted competing indicators like the WGI. (http://www.moibrahimfoundation.org/index/).

2.3 Economic performance and global links

Countries no longer operate in isolation no matter their size and economic conditions. External relations play a role in the performance of nations, and the debate about the merits and demerits of globalization centers around this issue. For instance, research shows a strong correlation between foreign trade and economic growth (see Frankel and Romer, 1999). There are doubtful questions about the effects of foreign assistance on economic performance of developing countries, with some putting it down and others advocating "aid for trade". However, the factor that these countries want aid increased suggests that aid is important at least for some countries. And there are pertinent issues of international finance, especially debt and debt servicing. There is thus a need for economic models to allow for global links.

3. Analytical framework

The value of the ith country's economic activity, such as its gross domestic product (Y_i) depends on the country's technical capability (X_i), i.e.,

$$Y_i = F(X_i), \quad i = 1, 2, 3, ..., N \ countries. \tag{1}$$

Moreover, technical capability has two broad dimensions: domestic ($X_{i,d}$) and global ($X_{i,f}$) links, that is, $Y_i = F(X_{i,d}, X_{i,f})$. Domestic production in which global links are, respectively, absent and exogenously present would be (2a) and (2b) below:

$$
\begin{aligned}
Y_i &= A_i \bullet F(X_{i,d}) \quad (a) \\
Y_i &= X_{i,f} \bullet F(X_{i,d}) \quad (b),
\end{aligned}
\tag{2}
$$

where in (2a) $A_i \supset X_{i,f}$, in (2b) $X_{i,f} \supset A_i$, i indicates the ith country, d is for domestic, and f is for foreign links.

3.1. Economic performance and domestic resources ($X_{i,d}$)

Underlying domestic production relations are current and historical factors and forces of production. Current factors include land (R), economically-active population (N), and physical capital (K). Historical factors include the initial conditions of production in each country, normally measured by the level of income in some reference (initial) year (Y_0). The assumption is that Y_0 depends on historical legacies like colonial background (religion, language, political system, and such). For now restate (1) as

$$Y_i = A_i \bullet F(R_i, N_i, K_i) \quad (a)$$

$$Y_i = X_{i,f} \bullet F(R_i, N_i, K_i) \quad (b).$$

(3)

Without loss of generality, I simplify (3) by noting that the supply of land as a primary factor of production is limited, so that it can be set equal to unity, and as in previous studies its effects on economic activity are sufficiently picked up by variables such as trade openness, distance from the Equator, landlockedness, and so on[3]. If (3) is multiplicative in forma, then

$$Y_i = AK_i^{\alpha} N_i^{\beta}, \quad \alpha + \beta \leq 1,$$

(4)

where N consists of unskilled labor (L) and skilled labor defined as human capital (H).

Suppose $N = L^a H^b \Rightarrow L = (N \cdot H^{-b})^{1/a}$. Following Solow (1957), I also assume that L evolves at an exogenous rate (n) equal to the rate of growth of N, i.e.,

$$L = e^{nt}(N \cdot H^{-b})^{1/a}.$$

(5)

Given (5), (4) becomes

$$Y = AK^{\alpha} N^{\beta_1/a} e^{\beta_1 nt} \cdot H^{(a\beta_2 - b\beta_1)/a},$$

(6)

In per capita and natural logarithmic terms (6) is

$$y = a + \alpha k + \beta_1 nt + ((a\beta_2 - b\beta_1)/a)h.$$

(7)

where y = log(Y/N), k = log(K/N), h = log (H/N), a = productivity shifter, α = elasticity of capital, β_1 = elasticity of raw labor, and β_2 = elasticity of H, and n = natural rate of growth of N over time t.

Jones (1997), and Hall and Jones (1999) approximate H as the proportion of raw labor (L) that is skilled, where skills are gained through education, for example, so that

$$H = e^{\phi S}L,$$

(8)

where S = educational attainment measured as the number of years of schooling. However, Amavilah (2008) argues that (8) understates the level of H and overstates its statistical importance. Hence, the correct evolution of H is over the economically-active population (N), i.e.,

$$H = e^{\phi q} N. \tag{9}$$

This means that (9) is consistent with Romer (1989, 1990), Benhabib and Spiegel (1994), and Dinopoulos (1996). It suggests that H is quality N á lá Schultz (1981), Becker (1996), and others. The refining of N takes place through processes and activities like education, training, experience, health, nutrition, and mortality-fertility. Hence, in (9) q is a vector of processes and activities that refine N, and n is the constant growth rate of L equal to the growth rate of N, according to the exogenous neoclassical growth model.

Going back to (6), plugging in H, and simplifying results in

$$Y = AK^{\alpha} N^{(a\beta_2 + \beta_1(1-b))/a} e^{(\phi(a\beta_2 - b\beta_1))/a)q + \beta_1 nt} \tag{10}$$

Normalizing (10)

$$y = a + \alpha k + \frac{(\phi(a\beta_2 - b\beta_1))}{a} q + \beta_1 nt. \tag{11}$$

In (6) or (7) and (10) or (11) the state of technology (A, a) is the only domestic force. It is assumed to be nonstochastic and independent of L and H both contemporaneously and over time. Obviously, in developing countries (A, a) is likely associated with K. In addition, there are nontrivial relationships among A, H, and L, but I assume that (7) expresses the ith country's economic activity on the bases of primary domestic resources (factors and forces). The effects of these resources depend on the quality of surrounding institutions.

3.3. Economic performance, domestic resources, and governance (I)

As Section 2 above indicates there are many measures of governance, but only the World Bank's World Governance Indicators (WGI), and the Mo Ibrahim's governance index (MIGI) interest this paper. Obviously, different aspects of institution affect economic

performance differently. Here I argue that the primary influence on production of institutions and institutional quality takes place through improving the quality of the population - "mining population for human capital" (Amavilah, 2008a).[4] In this way it is easy to see measures of governance as elements of q, so that, assuming $q^T = (S, I)$, I express (10) as

$$Y = AK^{\alpha}N^{a\beta_2 + \beta_1(1-b)/a}e^{(\phi_1(a\beta_2 - b\beta_1))/a)S + (\phi_2(a\beta_2 - b\beta_1))/aI + \beta_1 nt}, \tag{12}$$

where S and I are educational attainment and governance, respectively. Now, if I let $\theta_1 = ((\phi_1(a\beta_2 - b\beta_1))/a)$, $\theta_2 = ((\phi_2(a\beta_2 - b\beta_1))/a)$, then normalizing and logging both sides of (12) gives

$$y = a + \alpha k + \theta_1 S + \theta_2 I + \beta_1 nt. \tag{13}$$

3.4. Economic performance, domestic resources, governance, and global links ($X_{i,f}$)

Eqs.(8) and (13) express the ith country's economic activity in terms of primary domestic resources (factors and forces) and surrounding institutions. However, next I add the fact that African countries no longer operate in isolation from the rest of the world. What are the impacts of global links on these countries, and how do they compare to those of domestic resources and institutions? To explore this question I identify and introduce into (12) and (13) key aspects of international relations such that

$$Y = AK^{\alpha}N^{a\beta_2 + \beta_1(1-b)/a}e^{\theta_1 S + \theta_2 I\beta_1 nt}X_f^{\gamma}. \tag{14}$$

Then, I consider four global links. First, is a measure of the extent to which the ith country is integrated into the global economy (Inter). The measure is calculated by WDI as the difference between the rates of growth of exports and GDP. Second, aid dependency (Aid), a percent of foreign aid in gross national income. Finally, I link production of GDP to net international tourism (Tour), a percent of exports of tourism less imports of tourism.

Normalizing (14) and taking the natural logarithms on both sides leads to

$$y = a + \alpha k + \theta_1 S + \theta_2 I + \gamma x_f + \beta_1 nt, \tag{15}$$

where $x_f = X_{i,f}/N$, where appropriate.[5] The task now turns to how to estimate (15).

4. Estimations

Data on some variables of interest such as MIGI are available only for 2000, 2002, and 2007. In the name of consistency that means that all estimations cover only these three years across 38 African countries.

4.1 Data

In a companion paper (governdata available at http://ideas.repec.org/e/pam8.html, http://mpra.ub.uni-muenchen.de/view/people/Amavilah,_Voxi_Heinrich.html, and http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=347624), I describe the data in detail. Here it suffices to say the dependent variable (*y*) is per capita GDP, drawn from the PWT 6.2 (Heston, Summers, and Aten, 2006). Key independent variables include per capita physical capital (*k*), represented by the percent of GDP that goes to fixed capital formation as listed in IMF's IFS (2007). The same data is available from the PWT 6.2, but it has gaps for some countries. Besides *k* there is H. However, the Mincerian approach measures of (H as the improved labor force, with the process of improvement taking place mainly through education, but sometimes also via on-the-job training, health, and job seniority. This approach underestimates the level of H and overstates its importance (see Amavilah, 2008). Here I argue that H is the quality of the economically-active population net of raw labor. It has two interactive components. The first component relates to the educational process and is normally proxied as years of schooling (S). But educational attainment is so much higher the better the quality of surrounding institutions. Hence, $H=f(S,I)$, where in some estimations $I \equiv MIGI$ and in others $I \equiv WGI$.

WGI and MIGI have different dimensions listed in Table 1. Some dimensions are predictably (expected *a priori* to be) inversely signed; others are not as clear. This expectation is consistent with the "law of motion" by which H is built through education and depreciated by age (see Cohen, 1996, p. 355). The only difference, and not a trivial one, is that technological progress slows the rate of H depreciation.

Since *y* is per capita GDP, and we really do not need data for either L or N. Instead, we can use the rate of population growth (*n*) with a coefficient $\beta_1 t$, or a time dummy variable (*t*) with a coefficient $\beta_1 n$. Also, the data for the X_f, consisting of three variables Inter, Aid, and Tour, comes from WDI reports. In this case, as in all other appropriate cases, the data are real, rather than nominal.

Table 1 - Dimensions of governance

World governance indicators (WGI)

- **Voice and accountability**
- **Political stability and absence of violence**
- **Government effectiveness**
- **Regulatory quality**
- **Rule of law**
- **Control of corruption**

Mo Ibrahim's governance index (MIGI)

- **Safety and security**
- **Rule of law, transparency, and corruption**
- **Participation and human rights**
- **Sustainable economic opportunity**
- **Human development**[1]

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[1]In reading the documentation of this index I notice that the authors use "human development" and "economic development" interchangeably. I take the definition for granted.

4.2 Specification and Method

I assume the equations to be estimated are linear, at least in the parameters, so that the general specification is,

$$y=F(k,t,S,I,x_f)+e_i. \tag{16}$$

In addition, I assume normal error and apply the OLS estimator is the estimation method. In doing so I further assume there is little autocorrelation, and no variable interactions. This is obviously a shortcoming, but one that is not addressed in this paper, although *ad hoc* adjustments are made to address conventional econometric problems.

4.3 Procedure

The estimation proceeds in three interrelated steps. First, I consider the following three relations:

$$y=F(X_d)+everythingelse \quad (a)$$
$$y=F(X_f)+everythingelse \quad (b) \tag{17}$$
$$y=F(I)+everythingelse \quad (c).$$

Second, I estimate

$$y=F(X_d,X_f)+everythingelse \ (X_d{\times}X_f)=0 \quad (a)$$
$$y=F(X_f,I)+everythingelse \ (X_f{\times}I)=0 \quad (b) \tag{18}$$
$$y=F(I,X_d)+everythingelse \ (X_d{\times}I)=0 \quad (c).$$

As a final step I turn to

$$y=F(X_d,X_f,I)+everythingelse. \tag{19}$$

5. Results

The tables that follow present estimated results. Tables 2 and 3 display *unsanitized* results. Although econometrically impure, my opinion is that unsanitized results are the real results; they stand a better chance for policy relevance than sanitized results, in Table 4. While bleaching the results meets the requirement of good econometrics, it also kills, figuratively speaking, all the germs, including the good germs. In this case opportunity costs are truly ubiquitous.

5.1. Real (unsanitized) results

If one assumes that performance depends on domestic resources (X_d) alone, it is clear that investment (k) and human capital (H) in its Education and Health components are key factors. These three variables explain up to 38% of the variations in per capita GDP, with the impact of k being the largest and of Health the second largest.

Assume that real GDP depends on the quality of institutions alone. Using WGI measures of governance reveals that a percentage improvement in the average quality of institutions contributes half a dollar to real GDP per capita, which explains 24% of variations in the relationship, and leaving a large "measure of our ignorance", as Abramovitz (1986) would put it. Similarly, utilizing MIGIave a unit improvement in governance has an impact of 1.7 on *y*. However, the explanatory power as the Buse-R-square shows is comparable. Thus, the impacts of WGIave and MIGIave are larger than those of X_d.

If we disaggregate governance into its six WGI dimensions, the Buse R-square increases significantly to 62%. Measures against corruption contribute positively, but in a statistically insignificant way, to real GDP. The rule of law and freedom of expression constrain the growth of GDP. By the MIGI, the effects of human rights and economic development are positive, though statistically insignificant. Property rights are not safe and secure.

If one lets these countries interact with the outside world, and measure the extent of interaction with the PWT 6.2 indicator of Openness, openness is statistically significant to per capita GDP. However, disaggregating openness and representing global links by the extent of integration (Inter), aid-dependency (Aid), and net tourism (Tour), openness is a major constraint on y. Specifically, this group of countries is not sufficiently integrated in the global economy to benefit from it. The countries are also too dependent on aid, while tourism is too narrow. This makes sense since tourism is really factor land in the classical sense, and as such subject to diminishing returns. In fact these variable explain little as the residual is well above the mean of the dependent variable, suggesting some other variables are missing.

Table 2 - Africa's GDP depends on either domestic resources, institutions, or external relations, 2000-2007
(Parentheses are T-ratios at 5% significance level, mean ln(GDP) = 7.3184)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Residual = A							
ln(Constant)	4.182	7.484	7.689	0.4911	-0.7943	5.944	8.123
	(6.309)	(68.891)	(122.810)	(0.37170	(-0.812)	(29.369)	(86.517)
Domestic Resources							
ln(investment-GDP Ratio = k)	0.579						
	(7.628)						
ln(Eduction = Years of schooling = H)	0.083						
	(2.552)						
ln(Health = Average life expectancy = H)	0.3033						
	(1.882)						

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
WGI Institutions							
WGI Average		0.559 (6.154)					
Corruption			0.011 (0.121)				
Regulatory			0.197 (1.951)				
Voice			-0.076 (-1.011)				
Stability			0.139 (2.760)				
Effectiveness			0.760 (6.107)				
Rule of Law			-0.256 (-1.777)				

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
MIGI Institutions							
MIGI Average				1.675 (5.715)			
ln(Safety)					-0.275 (-2.318)		
ln(Rule of Law)					0.559 (3.612)		
ln(Human Rights)					0.013 (0.120)		
ln(Opportunities)					1.666 (10.105)		
ln(Development)					0.197 (0.783)		

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Global Links							
PWT 6.2 Links							
ln(Openness)						0.293 (5.919)	
WDR Links							
Integration							-0.024 (2.854)
ln(Aid dependency)							-0.419 (-11.142)
Net Tourism							-0.003 (-1.424)
Summary Statistics							
Buse R-square	0.3806	0.2494	0.6192	0.2227	0.6845	0.2351	0.5544
SEE	0.9799	0.9968	0.9536	0.9916	0.9748	0.9759	0.9821
DW[ρ]	1.197 [0.04]	1.121 [0.04]	1.132 [0.07]	1.112 [0.04]	1.198 [0.02]	[0.06] -4.319	1.276 [0.05]
Normal t	-4.513	-4.199	-3.656	-4.325	???		-4.296

Table 3 - Domestic resources, institutions, and external relations, and Africa's GDP, 2000-2007 (Parentheses are T-ratios at 5% significance level, mean ln(GDP) = 7.3184)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ln(Constant)	7.833 (7.155)	8.375 (7.245)	-1.146 (-0.921)	-3.030 (-2.360)	7.790 (14.170)	7.725 (12.329)	1.132 (1.139)	1.428 (1.653)
ln(Investment-GDP Ratio)	0.249 (1.917)	0.181 (1.435)	0.324 (3.919)	0.499 (6.341)	0.363 (4.128)	0.309 (3.789)	0.566 (5.560)	0.719 (9.764)
ln(Education)	0.207 (3.785)	0.318 (6.686)	0.108 (2.320)	-0.079 (-2.37)	0.198 (7.708)	0.258 (7.492)	0.141 (3.639)	0.024 (0.556)
ln(Health)	-0.415 (-1.551)	-0.642 (-2.353)	-0.032 (-0.175)	0.021 (0.088)	-0.203 (-1.733)	-0.189 (-1.335)	-0.165 (-0.956)	-0.259 (-1.385)
ln(Openness)	0.110 (1.699)	0.168 (2.931)	0.233 (4.440)	0.069 (1.068)				
WGI Average	0.728 (7.637)				0.490 (7.179)			
WGI Corruption		-0.013 (-0.107)				0.135 (1.899)		
WGI Regulatory		0.557 (4.422)				0.443 (6.585)		
WGI Voice		-0.317 (-3.627)				-0.384 (-5.907)		
WGI Stability		0.131 (2.089)				0.149 (3.539)		

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
WGI Effectiveness		0.838 (4.965)				0.540 (5.854)		
WGI Rule of Law		-0.563 (-2.949)				-0.390 (-3.380)		
ln(MIGI Average)			1.602 (5.846)				1.449 (7.841)	
ln(MIGI Safety)				-0.303 (-1.846)				-0.329 (-3.489)
ln(MIGI Rule of Law)				0.755 (4.696)				0.301 (2.028)
ln(MIGIHuman Rights)				0.030 (0.280)				0.234 (2.748)
ln(MIGI Opportunities)				2.037 (13.040)				1.142 (9.104)
ln(MIGI Development)				-0.183 (-1.076)				0.14293 (1.497)
Integration					-0.020 (-2.907)	-0.033 (-3.797)	-0.023 (-2.825)	-0.034 (-5.843)
ln(Aid-dependency)					-0.401 (-15.681)	-0.345 (-15.618)	-0.418 (-14.917)	-0.337 (-15.697)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Net Tourism					-0.008 (-4.992)	-0.011 (-4.836)	-0.009 (-3.921)	-0.005 (-2.328)
Summary Statisitcs								
Buse R-square	0.5806	0.6223	0.4960	0.7323	0.9001	0.9027	0.8573	0.9372
SEE	1.0040	1.0040	0.9799	1.0085	0.9873	1.0179	0.9858	1.0334
DW[ρ]	1.029 [0.8]	1.195 [0.02]	1.0449 [0.09]	1.2231 [0.00]	1.3805 [-0.02]	1.3955 [-0.04]	1.3492 [0.01]	1.3410 [0.01]
Normal t	-4.3275	-4.1313	-4.1373	-2.8198	-3.3506	-2.6242	-3.1963	-3.1404

Table 4 - Domestic resources, institutions, and external relations, and Africa's GDP, 2000-2007 (Parentheses are T-ratios at 5% significance level, mean ln(GDP) = 7.3184)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
ln(Constant)	7.666 (136.82)	-0.548 (-0.867)	8.320 (7.421)	-2.891 (-2.981)	7.725 (12.329)	0.515 (0.748)	1.464 (1.804)
ln(Investment-GDP Ratio)			0.206 (1.711)	0.501 6.195	0.309 (3.789)	0.598 (6.472)	0.757 (10.548)
ln(Education)			0.326 (7.347)	-0.073 (-2.038)	0.258 (7.492)	0.129 (3.740)	
ln(Health)			-0.626 (-2.338)		-0.189 (-1.335)		-0.254 (-1.384)
ln(Openness)			0.149 (2.678)	0.066 (1.089)			
WGI Corruption					0.135 (1.899)		
WGI Regulatory	0.131 (1.718)		0.511 (4.914)		0.443 (6.585)		
WGI Voice			-0.345 (-4.140)		-0.384 (-5.907)		
WGI Stability	0.211 (5.087)		0.149 (2.592)		0.149 (3.539)		
WGI Effectiveness	0.897 (9.707)		0.936 (6.375)		0.540 (5.854)		

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
WGI Rule of Law	-0.578 (-5.356)		-0.622 (-3.889)		-0.390 (-3.380)		
ln(MIGI Average)						1.424 (8.055)	
ln(MIGI Safety)		-0.344 (-3.219)		-0.297 (-1.821)			-0.333 (-3.550)
ln(MIGI Rule of Law)		0.808 (7.252)		0.786 (5.697)			0.229 (1.601)
ln(MIGI Human Rights)							0.236 (2.976)
ln(MIGI Opportunities)		1.616 (13.606)		1.995 (12.081)			1.213 (11.528)
ln(MIGI Development)				-0.168 (-1.053)			0.125 (1.256)
Integration					-0.033 (-3.787)	-0.024 (-3.384)	-0.035 (-6.080)
ln(Aid-dependency)					-0.345 (-15.618)	-0.412 (-15.824)	-0.343 (-16.594)
Net Tourism					-0.011 (-4.836)	-0.009 (-4.575)	-0.006 (-2.474)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Summary Statisitcs							
Buse R-square	0.6644	0.7284	0.6404	0.7045	0.9027	0.8630	0.9383
SEE	0.9914	0.9881	1.0071	0.99679	1.0179	0.9963	1.0239
DW[ρ]	1.2481	1.2009	1.2436	1.2225	1.3955	1.3742	1.3378
	[0.02]	[0.01]	[0.01]	[0.00]	[-0.04]	[-0.01]	[0.01]
Normal t	-3.7545	-3.3867	-3.7438	-2.6242	-2.6242	-2.8004	-3.8757

Regressions in which y depends on investment, education, life expectancy, PWT 6.2 openness, and various WGI indicators of institutional quality, finds the rule of law, freedom of expression, health, and corruption too constraining, the first three in a significant manner. MIGI measures of institutional quality produce similar results. Overall, for both MIGI and WGI, health, rule of law, and freedom of expression are the main obstacles to economic performance of this group of countries.

5.2. Bleached (sanitized) results

Table 4 documents some results *sanitized* against basic econometric problems by *ad hoc* adjustments like dropping variables whose effects are insignificant. Comparing these results to those in Tables 2 and 3 one notices considerable improvement in the statistical strength of the parameters. Across all models gross domestic investment has the largest positive effect. On average openness favors income generation in this group of countries. However, when disaggregated into the extent of integration into the global economy, dependency on foreign aid, and tourism, the results are negative.

Also across countries WGI measures of institutional quality are very significant with government effectiveness being strongest followed by the rule of law, but of opposite sign. The explanatory power increases to 64%. This statistic is 70% for the MIGI variable, but here it is education, safety and security, and development which are limiting.

6. Conclusion

In recent years African countries have performed well (Ruffing, 2008). How are we to understand that performance? This paper suggests that to understand what is happening one must see that economic performance depends on domestic resources, global links, and institutional quality. The results of the analysis reveal that gross investment has had the most consistent positive effect on the real incomes of these countries. This support the conclusion reached by S. Devarajan, W. Easterly, and H. Pack (2002) that "low investment is not the constraint on African development." The education component of human capital is generally important, but only after the threshold of 10 or more years of schooling. This may well be suggestive of Hanushek and Woessmann's (2008) study that shows that what matters for development is not the quantitative, but the qualitative aspects of education (cognitive skills); test scores contribute more to the GDP growth than years of schooling and openness (see their p. 639).

The results also shows that while openness in general is a good thing, openness to fierce competition through global integration and aid-dependency harms the performance of this group of countries. Almost all countries in the group have a surplus tourism export account. On average, however, the effects are negative, which contradicts Fayissa, Nsiah, and Tadasse (2007), although their sample size was larger.

Improvements in the average quality of institutions, as measured by both the WGI and MIGI, have meant high real GDPPC. At the disaggregate level the results show that the rule of law and freedom of expression under the WGI institutional regime, and safety and security, and human development under the MIGI regime, have constrained real GDPPC.

I recognize two weaknesses of the results of this paper: variable interactions were assumed away, and limited degrees of freedom were ignored. Even with that shortcoming, the implications for policy and further research are clear..

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Endnotes

1.The terms "rules of inference" and "transformations" in the manner used here are from

Wayne A. Wickelgren's *How to Solve Mathematical Problems*, Dover Publications, Inc., 1995.

2. See Amavilah's (2006) comment on AJR at www.http://papers.ssrn.com/sol3/papers.cfm?abstract_id=911324.

3. Developing countries essentially trade in land to the extent they export mainly raw materials.

4.E.G. Siba (2008) makes a good effort of examining the factors that influence institutional quality in Sub-Saharan Africa.

5.A. Navas-Ruis (2007) provides a theoretical links of trade openness and institutional change to economic growth that complements Acemoglu, Johnson, and Robinson (2005).